

Does nuclear energy create most of our energy?

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Actually, every form of energy we use, except nuclear energy, derives from solar energy. Animals (including humans) eat plants that get their energy from the sun. Fossil fuels were once plants that got their energy from the sun. Wind is caused by solar heating in the atmosphere. Hydroelectricity starts with evaporation, etc.

A star runs on fusion energy. It is a furnace that burns hydrogen left over from the Big Bang and turns it into progressively heavier elements. We consider an element heavier if it has more protons than an element against which we are comparing it. Every time a star fuses two atoms, the result is a heavier atom (more protons) and a release of energy. This process releases more energy at the low end of the elemental spectrum (those with fewer protons), and it stops at iron, with its 26 protons. Iron is so stable that it cannot be fused further by the stellar furnace.

A star that has built up enough iron over a long period of time suffers from iron poisoning. This slows down its fusion to the point that the star doesn't work any more, and it starts to die.

Without its energy source to keep it "fluffed up," the star collapses on itself. As this happens, incredible amounts of energy are released as the potential energy of stellar materials is converted into kinetic energy. This reaction, in turn, releases a tremendous amount of energy, enough to fuse even iron and heavier elements into the heaviest element we find on Earth, uranium, with 92 protons. Uranium would not exist (nor would we) without the death of stars that spew the entire periodic table of elements into space. Uranium is so heavy, and has so many protons, that it is an unstable element. That makes it radioactive, and when a uranium nucleus decomposes, it breaks apart into the smaller, lighter nuclei of lighter atoms and releases a bit of energy. That is the energy we use in nuclear reactors.

Gordon McDonough, Science evangelist

Occasionally questions are sent in to edu-bsm@lanl.gov or are left in our feedback box in the Museum.

We work to provide answers to these questions on [our blog](#) and the site where we list our [favorite questions and answers](#).



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